# Headquarters U.S. Air Force

*Integrity - Service - Excellence*

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# Air Force Sustainable Development – What, Why and How

## HQ AFCEE/TDD

## July 2004

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# What is “Sustainable”?

- For the Air Force, "sustainability" is the capacity to continue our mission without compromise. It is the ability to operate into the future without decline - either in the mission or the natural and man-made systems that support it.
- “Sustainable development” (SD) applies this idea to how we deliver, maintain and operate facilities.

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# What's a successful project?

- Traditional project goals:  deliver the facility on time, under budget, with high quality
- "Quality" = Meeting the user's functional needs
- Sustainability redefines "quality" – so that our goal becomes the creation of *high performance buildings.*

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# A High Performance Building:

- **Has energy, economic, and environmental performance that is substantially better than standard practice**
  - Is energy efficient, so it saves money and natural resources
  - Is a healthy place to live and work for its occupants
  - Has relatively low impact on the environment
- **All this is achieved through a process called *whole-building design***

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# Whole-Building Design

- **Design approach that considers all building components during the design phase**
  - It integrates all the subsystems and parts of the building to work together
  - Classic example:  day-lighting and envelope design to reduce HVAC and power use
  - Requires the design team be fully integrated from the beginning of the process – can include specialists: energy, materials, indoor air quality
- **Commissioning ties it all together**

# Commissioning

- **Building commissioning is the process of ensuring that building systems and equipment are designed, installed, tested, and capable of being operated and maintained according to the owner's operational needs**
  - It starts in the planning stages with the hiring of a commissioning authority
  - It continues throughout project development and after project completion

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# What are our requirements?

## Executive Orders (EO) including:

- **EO 13101** – Waste Prevention, Recycling, Affirmative Procurement
- **EO 13148** – Environmental Accountability, P2
- **EO 13149** – Transportation Oil Reduction, Alternative Fuels, Hybrid Vehicles

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# What are our requirements?

**Executive Order (EO) 13123:** "Greening the Government through Efficient Energy Management"

**Requires DoD to develop sustainable design principles and apply them to the siting, design, and construction of new facilities.**

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# DoD Sustainable Development Principles

1. **Optimize Site Potential**
2. **Minimize Energy Consumption**
3. **Protect and Conserve Water**
4. **Use Environmentally Preferable Products**
5. **Enhance Indoor Environmental Quality (IEQ)**
6. **Optimize O&M Practices**

***From DoD and USAF SD policy - defined in the Whole Building Design Guide and aligned with the LEED Rating System***

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# Why should we care? Reason #1: Resource Use

## Commercial and residential buildings use:

- **65.2% of total U.S. electricity consumption**
- **>36% of total U.S. primary energy use**
- **12% of potable water use in the U.S.**
- **40% (3 billion tons annually) of the raw materials that are used globally**

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# Reason #2: Emissions and Wastes

## These same buildings produce:

- **30% of total U.S. greenhouse gas emissions**
  - U.S. buildings are responsible for more CO2 emissions than those of any other country in the world - except for China
- **Construction and demolition waste**
  - 2.8 lbs per person per day in U.S., as compared to 4.3 lbs for all other types of municipal trash

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# Reason #3: Indoor Environmental Quality

- **People spend 90% of their time indoors**
  - The concentration of pollutants indoors is typically higher than outdoors, sometimes by as much as 10 or even 100 times
- **Indoor pollutants come from:**
  - Building materials (adhesives and sealants, paints, carpets, composite woods)
  - Outdoor sources (air intakes next to exhaust sources such as parking garages)
  - Indoor sources (copier rooms, cleaning products)

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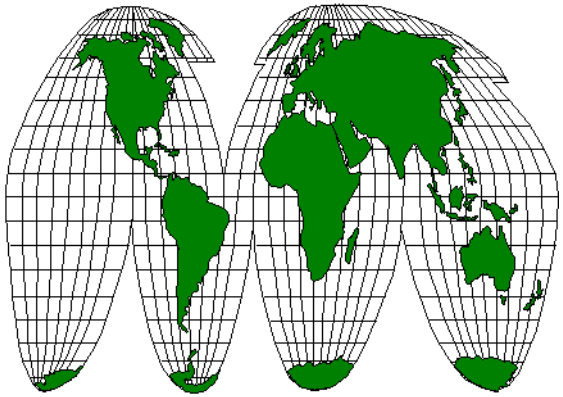
# The Scope of the Issue

- **DoD:**
  - 600,000 buildings/ structures
  - 30 million acres



- **Air Force:**
  - 166 Installations – 10 million acres
  - 731 million square feet of buildings

# PM Responsibilities

## The Air Force Project Manager:

- "...ensures the Air Force achieves its goals and objectives (i.e. quality, maintainable facilities delivered on time and within budget)" [PM Guide]
- leads an interdisciplinary team applying sustainable development concepts to MILCON and non-privatized housing projects [CE Policy Letter]

# It All Starts with Planning

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- **Many decisions are made during the programming and siting phases that can limit your ability to apply SD criteria later**
  - Talk with your programmers and base comprehensive planners about SD
- **Acquisition Strategy:  consider design-build**

# Actions the PM Must Take

- **Ensure SD is in the RAMP**
  - SD requirements must be written into the RD, and responsibilities spelled out in the PMP
- **Choose an Experienced A-E**
  - Write selection criteria / FedBizOpps announcement appropriately
- **Include SD requirements in the SOW or RFP**

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# Actions the PM Must Take

- Educate team on SD goals and LEED actions at the Predefinition Conference
- Ensure SD is discussed at the Charrette
- Review design submittals for SD compliance
- Ensure SD is explained to Contractor at the Preconstruction Conference

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# What Design Criteria Apply?

- **AF Design Guides - revisions include SD**
- **All applicable codes continue to apply**
- **New Unified Facilities Criteria being written**
  - UFC for Sustainable Development
  - UFC and Sustainable Development Workbook (rating system) for MFH

# What Is the Metric?

## Leadership in Energy & Environmental Design

**A leading-edge system for designing, constructing, and certifying the world's greenest buildings, created by the U.S. Green Building Council**

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# The Focus of LEED™

**The focus of LEED™ is:**

**Design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants.**

The LEED-NC credits fall into six categories.

You choose only the credits that apply and are achievable for your project.

# What LEED Covers

## The six credit categories are:

- Site conservation and sustainable planning
- Water efficiency and safeguarding water quality
- Energy efficiency and renewable energy
- Materials and resource conservation
- Indoor Environmental Quality – the effect on occupants
- Process & Innovation credits for unique accomplishment

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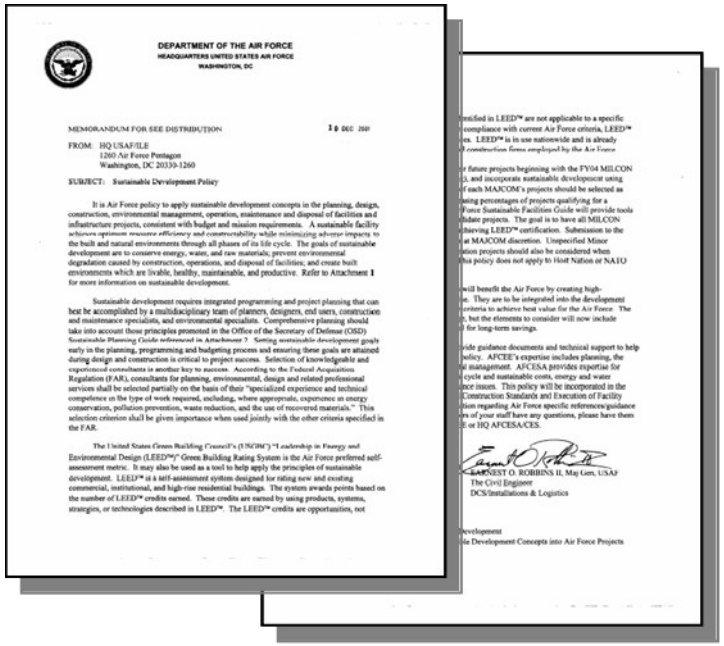
# LEED™ Provides Solutions…

- **Environmental Benefits**
  - Reduce the impacts of natural resource consumption
- **Health and Safety Benefits**
  - Enhance occupant comfort and health
- **Economic Benefits**
  - Improve the bottom line
- **Community Benefits**
  - Minimize strain on local infrastructures and improve quality of life

# …and LEED™ is in USAF Policy

## AF Civil Engineering policy letter - 19 Dec 01

- LEED™ is the AF-preferred self-assessment metric
- Goal: All MILCON projects in the FY09 program capable of achieving LEED™ certification
- ***Application for actual LEED™ certification is at MAJCOM discretion***



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, DC

MEMORANDUM FOR SEE DISTRIBUTION

FROM: HQ USAF/ILE
1260 Air Force Pentagon
Washington, DC 20330-1260

SUBJECT: Sustainable Development Policy

It is Air Force policy to apply sustainable development concepts in the planning, design, construction, environmental management, operation, maintenance and disposal of facilities and infrastructure projects, consistent with budget and mission requirements. A sustainable facility achieves optimum resource efficiency and constructability while minimizing adverse impacts to the built and natural environments through all phases of its life cycle. The goals of sustainable development are to conserve energy, water, and raw materials; prevent environmental degradation caused by construction, operations, and disposal of facilities; and create built environments which are livable, healthy, maintainable, and productive. Refer to Attachment 1 for more information on sustainable development.

Sustainable development requires integrated programming and project planning that can best be accomplished by a multidisciplinary team of planners, designers, end users, construction and maintenance specialists, and environmental specialists. Comprehensive planning should take into account those principles promoted in the Office of the Secretary of Defense (OSD) Sustainable Planning Guide referenced in Attachment 2. Setting sustainable development goals early in the planning, programming and budgeting process and ensuring these goals are attained during design and construction is critical to project success. Selection of knowledgeable and experienced consultants is another key to success. According to the Federal Acquisition Regulation (FAR), consultants for planning, environmental, design and related professional services shall be selected partially on the basis of their "specialized experience and technical competence in the type of work required, including, where appropriate, experience in energy conservation, pollution prevention, waste reduction, and the use of recovered materials." This selection criterion shall be given importance when used jointly with the other criteria specified in the FAR.

The United States Green Building Council's (USGBC) "Leadership in Energy and Environmental Design (LEED™)" Green Building Rating System is the Air Force preferred self-assessment metric. It may also be used as a tool to help apply the principles of sustainable development. LEED™ is a self-assessment system designed for rating new and existing commercial, institutional, and high-rise residential buildings. The system awards points based on the number of LEED™ credits earned. These credits are earned by using products, systems, strategies, or technologies described in LEED™. The LEED™ credits are opportunities, not

# USAF Approach to LEED™

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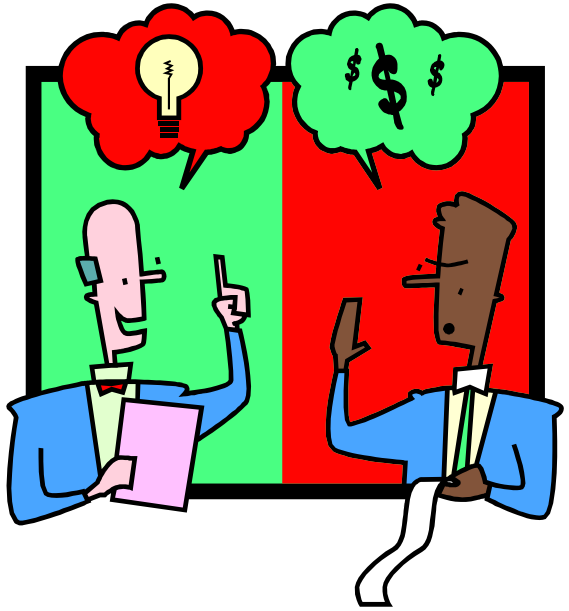
- **LEED™ measures project sustainability**
  - 20% of new facilities in 2004 are “pilot projects”
  - Increasing numbers of new projects each year capable of achieving LEED™ certification
  - Certifiability determined by MAJCOM from documentation provided by the A-E
- **But the actual certification is not mandatory**
  - Certification requires extra documentation and an application fee; MAJCOM decision.
- **Not every LEED™ credit applies to every project - and that’s okay!**
  - Choose the ones that fit your project

# Panic Attack!

**Do I *have* to be *Sustainable*?**

It's going to bust the budget and take more time and it can't be worth the effort…



# There Is Some Good News

**2003 Study conducted by The Capital E Group for the State of California:**

**Competitive first costs were shown for 33 buildings that were studied**

- 25 office buildings and 8 schools from across U.S.
- Chosen because cost data for both actual green design and conventional design was available for the same building

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# Capital E Study - Results

**Benefits greatly exceed the initial costs:**

- On average, the premium for green buildings was about 2%
- This investment would, on average, result in life cycle savings of 20% of the total construction costs
- Benefits were found in lower energy, waste and water costs, lower environmental and emissions costs, lower O&M costs, and increased productivity and health

# Level of Green Standard and Average Green* Cost Premium

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| Green Standard Premium | Avg Cost Premium |
|---|---|
| Level 1 – Certified (8 buildings) | 0.66% |
| Level 2 – Silver (18 buildings) | 2.11% |
| Level 3 – Gold (6 buildings) | 1.82% |
| Level 4 – Platinum (1 building) | 6.50% |
| Average - 33 buildings | 1.84% |

** Including design and construction costs*

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# Example AF Project Costs

- **AFRC estimates: additional A-E costs range from $8K to $24K**
  - Paying for learning curves – eventually these efforts will be part of design and not add-ons
- **Aeromedical Evacuation Unit, Minneapolis, FY04 AFRC project, PA $3,700,000**
  - Additional A-E cost for Certified is $37,280 (1.0%)
  - Additional A-E cost for Silver is $40,960 (1.1%)

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# Example AF Project Costs

- **Construction contractor additional costs for AFRC projects are ranging from $10K  to $40K**
  - The majority of cost increases seem to be for verifying LEED acceptability of materials, and record keeping

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# Cost Management Strategies

- Determine if the project is right
- Set a clear goal early
- Write contracts and RFPs clearly
- Select a team with experience
- Encourage team members to train
- Use an integrated design process
- Educate the decision makers
- Manage time carefully
- Look for rebates and incentives
- Understand commissioning and energy modeling

*Source: HQ ACC/CEC PMR Briefing*

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# Barksdale Fitness Center Sustainable Features

First and only USAF LEED Certified Facility: Applied for 27 credits

- ✓ Landscaping to reduce heat islands
- o Exterior design to reduce heat islands (criteria not met)
- o Infill development (didn't meet base density)
- ✓ Alternative transportation: bike racks & electric vehicle charging station
- ✓ Building commissioning: verification of design intent
- ✓ Energy efficiency: 22% > ASHRAE 90.1 & heat recovery

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# Barksdale Fitness Center Sustainable Features

## Applied for 27 credits (continued)

- ✓ Storage and collection of recyclables
- ✓ Recycled content building materials
- ✓ Construction waste: 75% diversion from landfill
- ✓ Indoor air quality: low VOC paints, adhesives, sealants
- ✓ Construction IAQ management plan
- ✓ Rainwater harvesting for flushing toilets and urinals
- ✓ LEED™ certified designer

# ACC: Issues for Follow-Up

- **Energy and Water Use – compare estimates with actual meter readings**
- **Transportation**
  - At Barksdale, the charging station was installed but then no electric vehicles were used
  - Base added more parking rather than encouraging walking

# ACC: Issues for Follow-Up

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- **Operations & Maintenance Issues**
  - Do custodians use “green” cleaning solvents and recycle wastes?
  - At Barksdale, collected rainwater colored by pollen; system was shut off

# AFCEE: Issues for Follow-Up

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- **AFCEE and HQ USAF/ILEC are working with MAJCOMs to identify SD execution issues**
- **Will prepare revised policy to address these**
- **Some of the issues on the table include –**
  - funding the costs of SD documentation and additional commissioning
  - measuring success – when and how
  - deciding what to do about projects that don't fit well into the LEED framework